

TOSHIBA

Leading Innovation >>>



Contributing to OSS projects and Lessons Learned

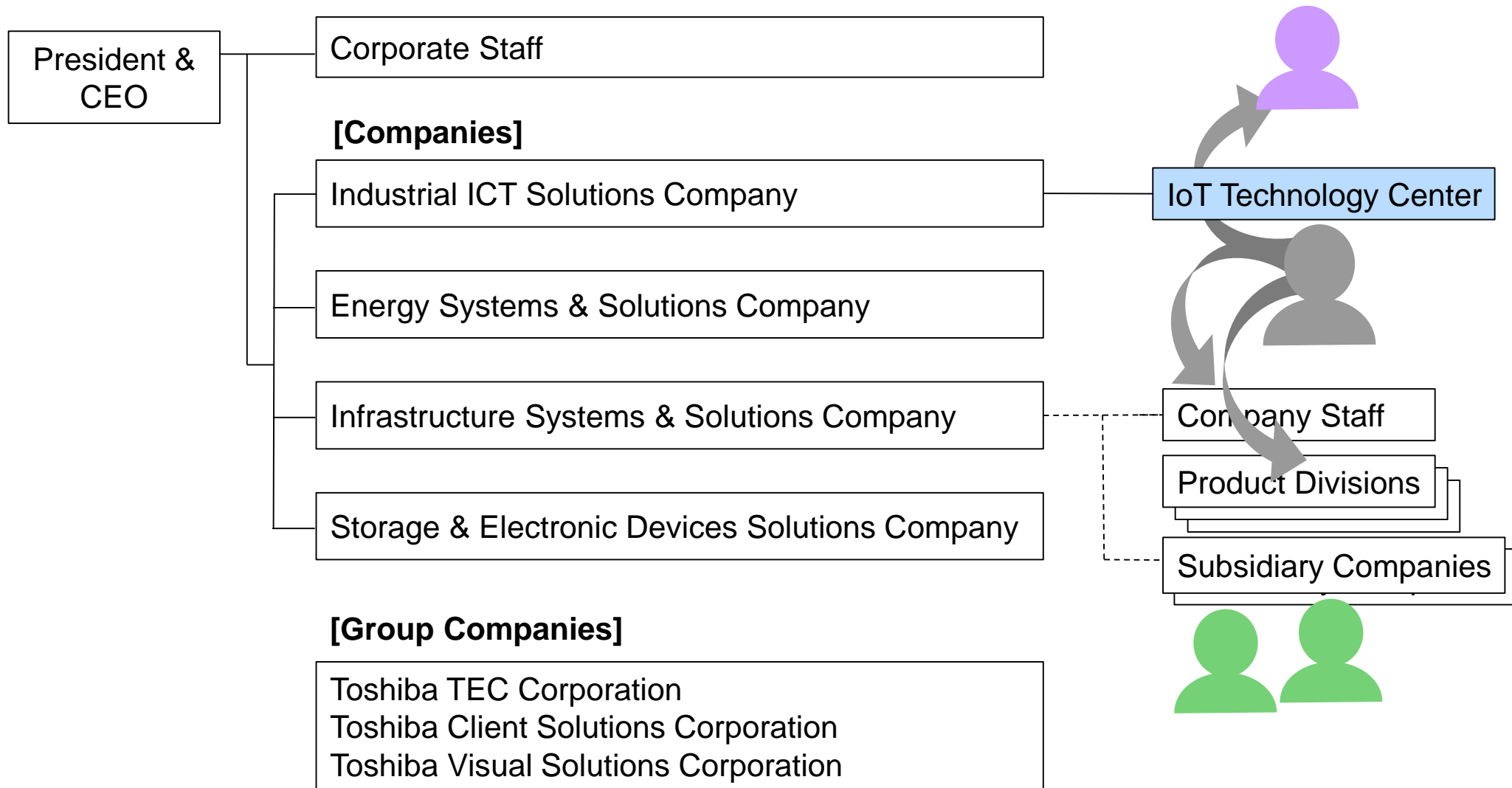
Yoshitake Kobayashi,
IoT Technology Center
TOSHIBA Corp. Industrial ICT Solutions Company
December 2, 2016

Who am I?

- **Yoshitake Kobayashi**

- Joined Toshiba in 2008
- Leading an embedded Linux team at Toshiba
- Other roles in open source projects
 - Board member of Civil Infrastructure Platform
 - Steering Committee Chairman of the CE workgroup, The Linux Foundation
 - Board member of the TOPPERS Project

TOSHIBA Business Structure (Overview)



Our team is in charge of different jobs

- **Encourage the use of OSS in our products**
- **Explain the benefits of OSS to our people**
- **Solve OSS misunderstandings**
- **Design new SW architectures with OSS**
- **Education for product developers**
- **Consulting about OSS license issues**
- **Produce in-house community engineers**
- **Collaborate with the OSS community**
- **Discuss with the OSS community**
- **Release our SW and tools as OSS**
- ...

Business Person

Community Member

Software Engineer

Legal Assistant

Planning Staff

Lecturer / Trainer

Why open source software?

- **Has it got the following advantages?**

- Quality
- Cost
- Open standard
- ... (and more)

Open Source
Software (OSS)

- **YES,
if we properly understand...**

- OSS itself
- Community
- Collaboration
- Contribution
- Risks

- **Understanding is not enough, let's contribute!**

Unique Innovation
(Value)

Cost

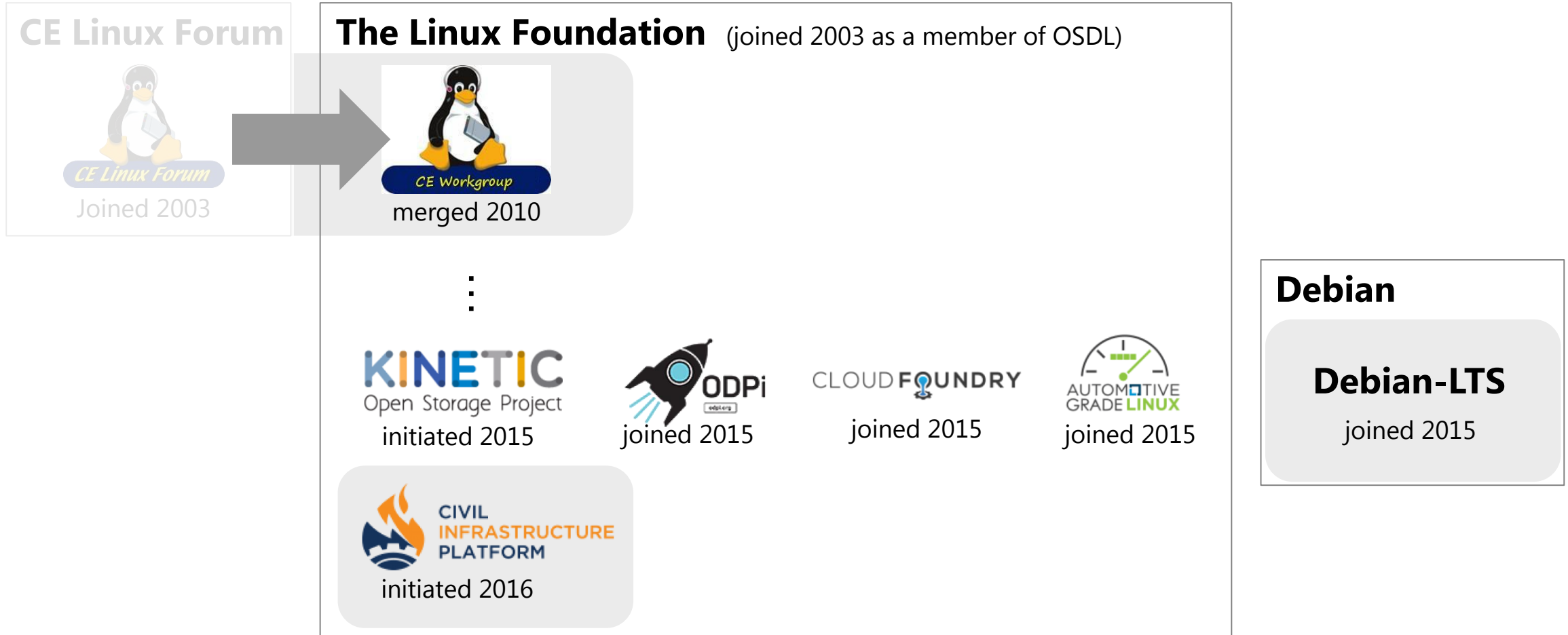
Delivery support for
the innovation

**Shared
Cost**

Commodity Platform

Reference: How to Contribute to the Linux Kernel, and why
it Makes Economic Sense, James Bottomley, 2009

Short history of open source project participation



Short history of open source project participation

CE Linux Forum



Joined 2003



The Linux Foundation (joined 2003 as a member of OSDL)



merged 2010

⋮

KINETIC
Open Storage Project
initiated 2015



joined 2015

CLOUD **FOUNDRY**
joined 2015

AUTOMOTIVE
GRADE **LINUX**
joined 2015

 **CIVIL
INFRASTRUCTURE
PLATFORM**
initiated 2016

Debian

Debian-LTS
joined 2015

Using Linux in Consumer Electronics



Digital TV



HDD recorder



Portable Audio Player

- **Probably we started to use Linux in 199x – 2000**
- **Technical requirements for Consumer Electronics that haven't been solved yet**
 - Audio, Video and Graphics
 - Bootup Time
 - Power Management
 - Real Time
 - Security
 - System Size
- **Established CE Linux Forum (CELF) in 2003**

Lessons learned from CELF

- CELF made a BIG mistake
 - Posted a specification without implementation
 - Embedded Linux Specification was published in May 2004
<https://lkml.org/lkml/2004/5/17/149>
http://celinuxforum.org/docs/CELF_Specification_V_1_0_R1-1.pdf

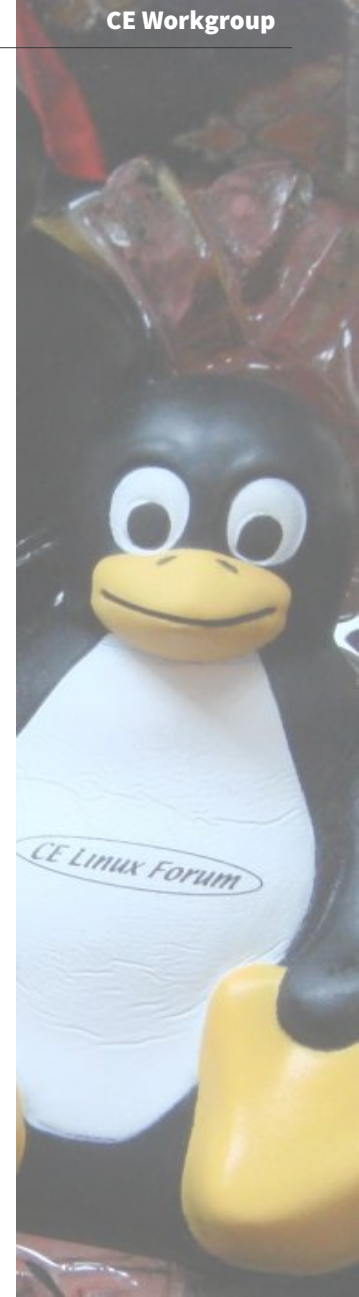
On Mon, May 17, 2004 at 12:05:36PM -0700, Tim Bird wrote:
 > I am writing to announce the availability of **the first draft of**
 > **the CE Linux Forum's first specification**. This specification
 > represents the efforts of six different technical working groups
 > over about the last 9 months.

If you want my 2 Cent:

- stop these rather useless specifications and provide patchkits instead
- try to actually submit the patches upstream to get a feeling which of your 'features' are completely hopeless, which are okay and which can better be solved in different ways.

- After this mistake, CELF changed the mind to "Implementation first"

CE Workgroup



Case studies of OSS compliance

- Is OSS Compliance complicated ?
 - Might be 'TRUE'

Various Skills as a



Business Person

Community Member

Software Engineer

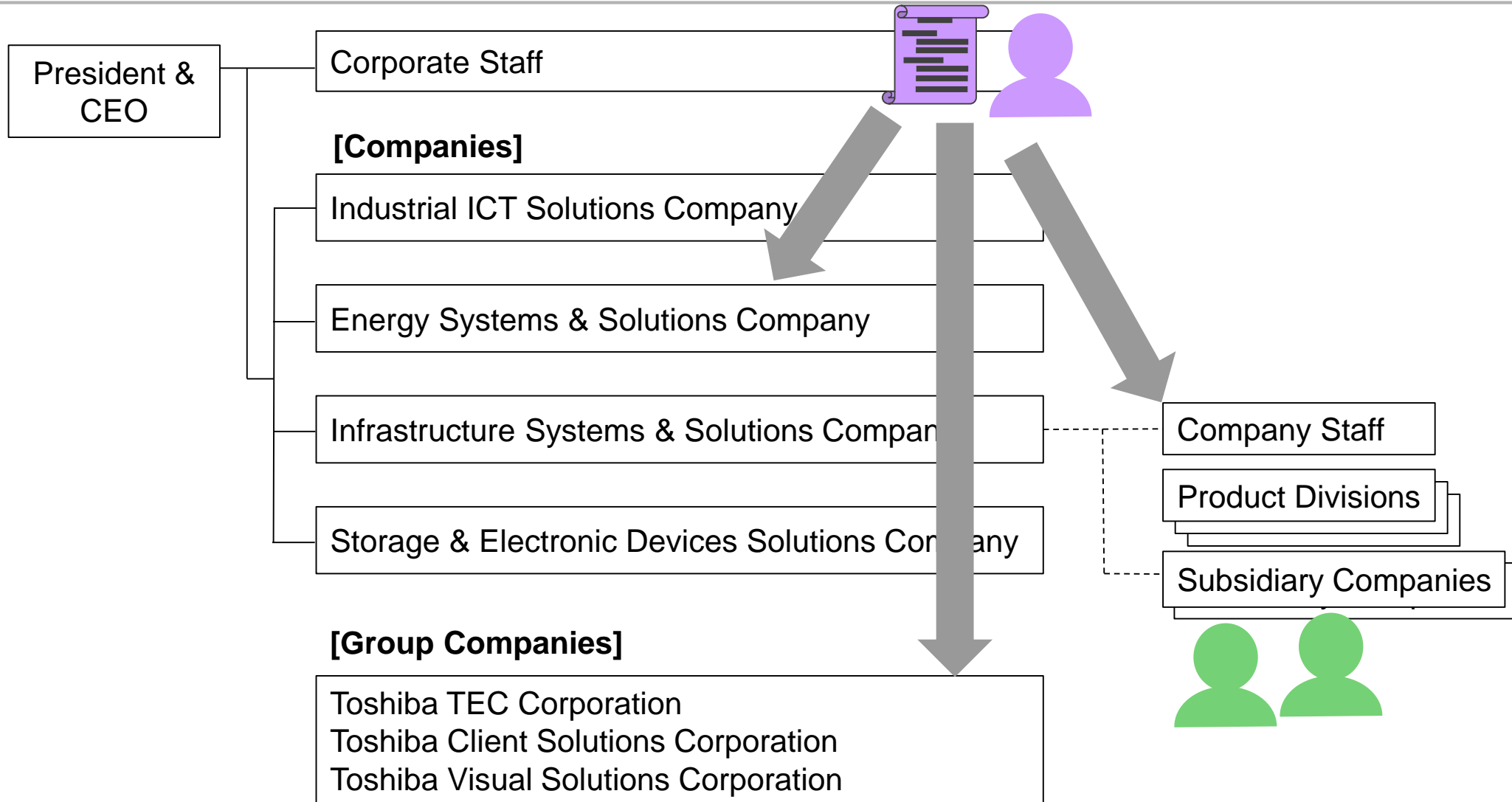
Legal Assistant

Planning Staff

Lecturer / Trainer

- Next: quick view of our OSS governance

Distributing corporate rules on OSS controls



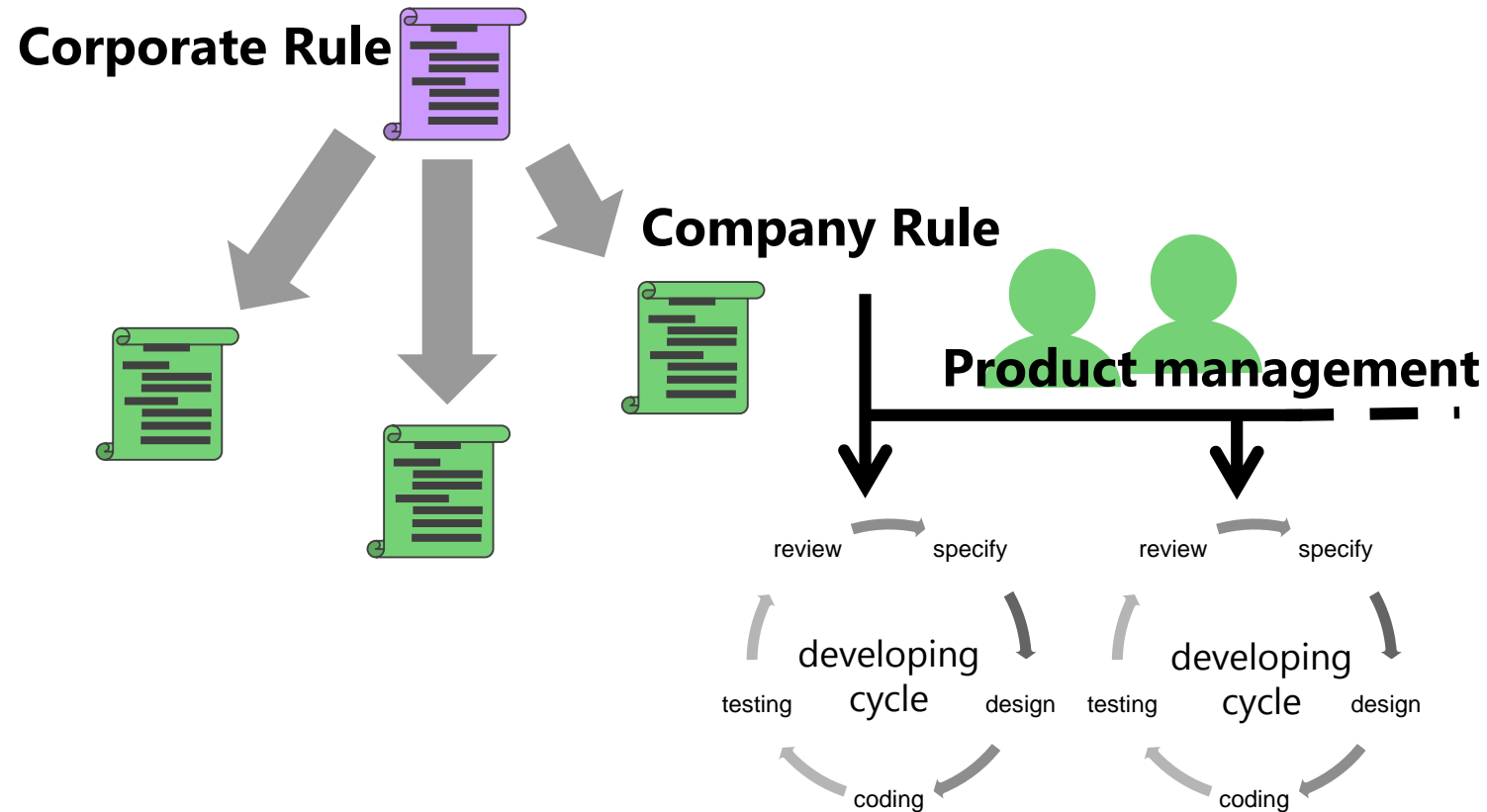
(OLD) Corporate Rule on OSS controls

- **Toshiba Group Companies shall comply with all applicable laws and regulations associated with patent law, copyright law and other intellectual property rights laws;**
- **Our concepts described in Corporate Rule are , roughly,**
 - List up all software components and their licenses in the product, namely make a Bill-of-Materials
 - Confirm the owner(s), the distributor(s) if any, its approval of use and/or propagation of each software component
 - Confirm each software component has no malformed or illegal code
 - Should protect our own and others' intellectual properties
 - ...



(Cont.)

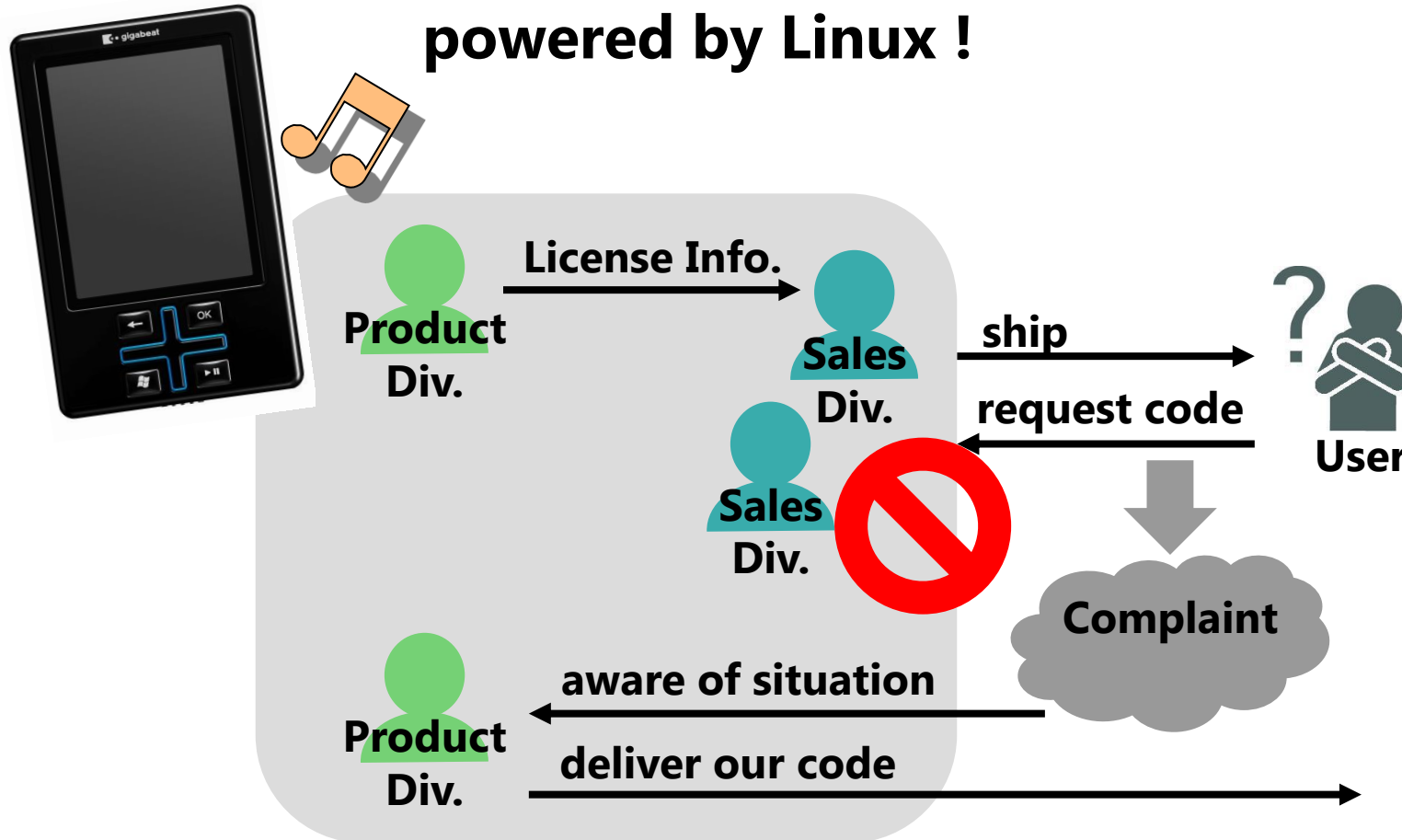
- Details, such as BoM format, Review routine or other action rules, are defined in each company.



- Next: 3 Case Studies to share our experiences.

Case Study 1:

In June, 2002 TOSHIBA released MP3 player “gigabeat” powered by Linux !



It took a several month to deliver our code.

(Cont.)

- **This case teaches us that not only product development but all related persons, i.e. sales or management, should know what licenses we have and what we should do for them.**
- **We decided to have “Corporate Rule on OSS Control”, the 1st document released in Nov., 2004.**
- **10 years ago, we had a several products with OSS, and things went very well ..**

Case Study 2:

Asking approval confirmation to Developers frequently, and then ..

From: "Poul-Henning Kamp"

Subject: Re: Confirmation: your copyright about NTP

To: "*****@toshiba.co.jp"

Citat:

Dear NTP Project Members. We are considering using your program "NTP" in our products. Before going any further, however, we would like to confirm the following so that we are sure to fully respect your rights. You are of the copyrights in the program. You have distributed the program under the attached license that permits us to use and redistribute the program with or without modification provided that any conditions stated in the license are met. If you would please send me a return email confirming the above, that would be most appreciated. And thank you very much for taking the time to create such a useful program. Thank you in advance for your kindness.

Let me get this straight: You, a major worldwide megacorp which employs thousands of lawyers, have downloaded the NTP reference implementation on the internet, containing a license for you to use with only certain trivial restrictions. But you do not trust the contents of the license file to be legally binding, so you send emails to addresses which you have never been in contact with before, to people you have no way of authenticating, asking them if the content of the file is correct. You then expect that the return mail you may or may not get will cover your legal obligations. In what legal proceedings you foresee you might expose yourself to, as a result of you using the NTP reference implementation. Let me record show that somebody is not getting their money worth of competent legal assistance. You could have done whatever any IT company has done until now, companies like Sun, IBM, Cisco, who trust the license file and happily use the NTP reference implementation without any legal worries. But instead of actually researching this point, you sent the pointless email instead. No, I (see below) will neither confirm nor deny my participation or the license status of the code I may, or may not, have written for the NTP reference implementation. If you want such assurance from me, you will have to send me a registered letter, my address can be found in any danish phone book or on the Internet, containing the questions you want answered, and a suitable token of appreciation, to make it worth my time to answer them. Proof of a sensible monetary donation to the NTP project would work, as long as I do not need to ask my lawyer to answer your questions. Until such time, I will place you in legal jeopardy with respect to your use of the NTP reference implementation, with my statement above, and my signature below; sign: Somebody who may or may not be, Poul-Henning Kamp Who may or may not have written parts of the NTP reference implemenation, which may or may not be covered by the license restrictions you quoted.

Reference URL: <http://www.version2.dk/blog/i-am-not-nice-man-11355>

(Cont.)

- The reason why it happened,
 “License = Contract” , we need a confirmation on each
 “License = Approval”, we need no confirmation
- Decade brings us much knowledge and reliability of OSS.
- **Corporate has revised the rule in February 2015.**
 - i.e. the evidence of approval is required.
- We shall keep refining on our rules.

Case Study 3:

Warning from Community again ! (August 2014)

Subject: Toshiba just holds me out
From: h...@gmx.net
Date: Thu, 21 Aug 2014 12:54:07 -0700

Hello,
I wrote to Toshiba around December 2013. Since then they just let me fill in formulas (name, address, phone number, model of the TV, etc.).
Now they just let me wait.
In May they wrote:

Linux Information for TOSHIBA PC:

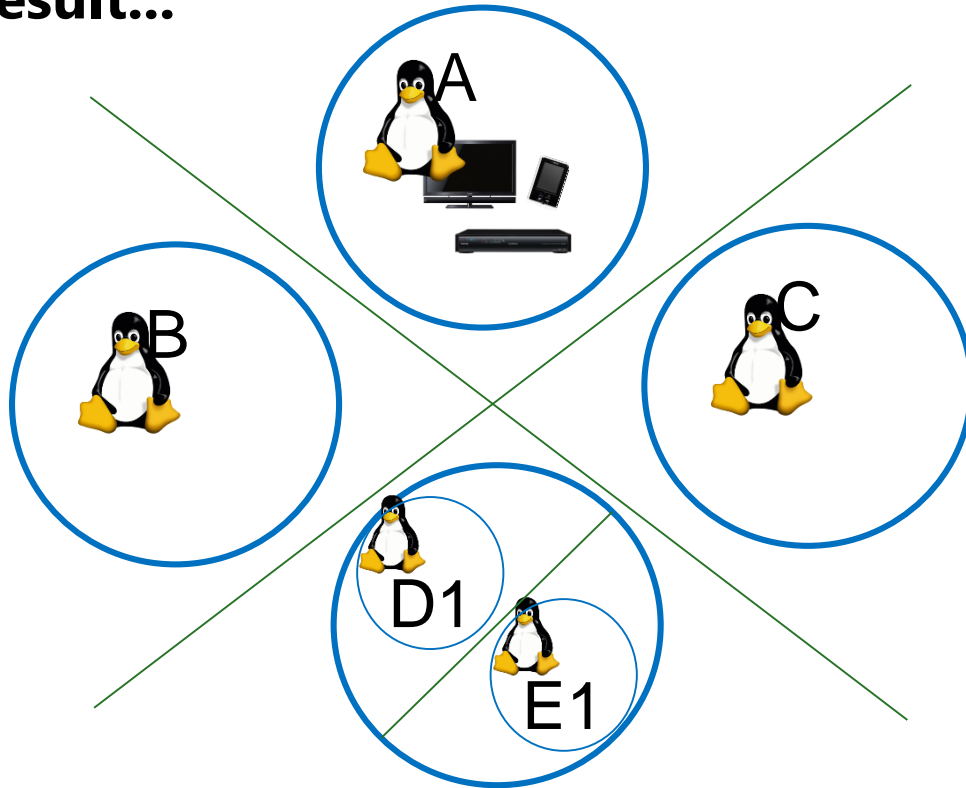
- > We received the following comments from TOSHIBA.
- >> Sorry to have kept you waiting.
- >> For shipment, we need re-check to openssl which announced security bugs.
- >> We will make sure to get back to you as soon as possible.
- > And we will be ready for shipment as soon as possible too.
- > We will let you know when the shipment is ready.

This mail was posted to a community site. The person who read this informed us soon.

Reference: <http://www.mail-archive.com/legal@lists.gpl-violations.org/msg00570.html>

Some years later.. (around 2008)

- **Many kinds of consumer electronic devices use Linux**
 - Most requirements have been solved
 - We have a well established Linux environment for CE products
- **Other business units (BU) have also started to use Linux**
- **As a result...**



Issues

- Using OSS that is not mature enough
- No concrete decision policies for choosing OSS
- Each BU used and modified different OSS
 - Same changes had been made in another BU
 - Also in upstream!
 - Difficult to maintain.. ☹

Actions

- Checked all development efforts
 - Act as a hub to share information
- Started providing a common Linux environment for Toshiba's products

Short history of our participation in open source projects

CE Linux Forum



Joined 2003



The Linux Foundation (joined 2003 as a member of OSDL)



⋮

KINETIC
Open Storage Project
initiated 2015



CLOUD **FOUNDRY**
joined 2015



Debian

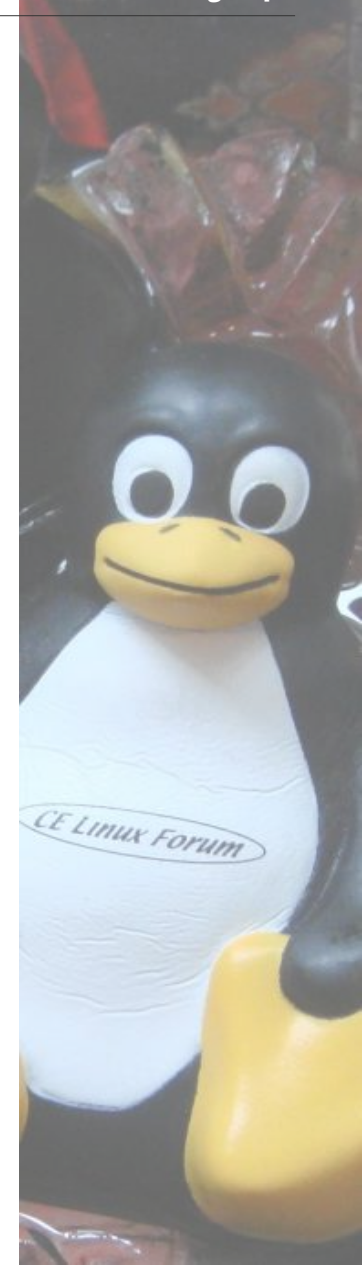
Debian-LTS
joined 2015

CE workgroup is changing the industry domain

- After the CE Linux Forum has merged with the Linux Foundation as CEWG, CEWG is extending the industry domain not only for CE but also for **industrial appliances, medical equipment, transportation/traffic control system and more wider embedded system industry domain**
 - CEWG are aiming at the wider use and collaboration of OSS for embedded systems
 - CEWG will bridge to the OSS community and the unique technological challenges in each industry domain


CE does not mean “Consumer Electronics”

CE Workgroup



Focus on Civil Infrastructure Systems

- List of my presentations at Linux Foundation's conferences
 - Evaluation of Data Reliability on Linux File Systems (ELC 2010, Apr. 2010)
 - Linux Kernel Acceleration for Long-term Testing (ELC-E, Oct. 2010)
 - Moving Forward: Overcoming Compatibility Issues (ELC, Apr. 2011)
 - Automated Regression Test Environment For Multiple Kernels (LinuxCon EU, Oct. 2011)
 - Ineffective and effective way to find out latency bottlenecks by Ftrace (ELC, Feb. 2012)
 - Improvement of Scheduling Granularity for Deadline Scheduler (ELC-E, Oct. 2012)
 - Deadline Miss Detection with SCHED_DEADLINE (ELC, Feb. 2013)
 - An Essential Relationship between Real-time and Resource Partitioning (ELC-E Oct 2013)
 - Using RT Preempt patch with LTSI kernel (ELC 2014, Apr. 2014)

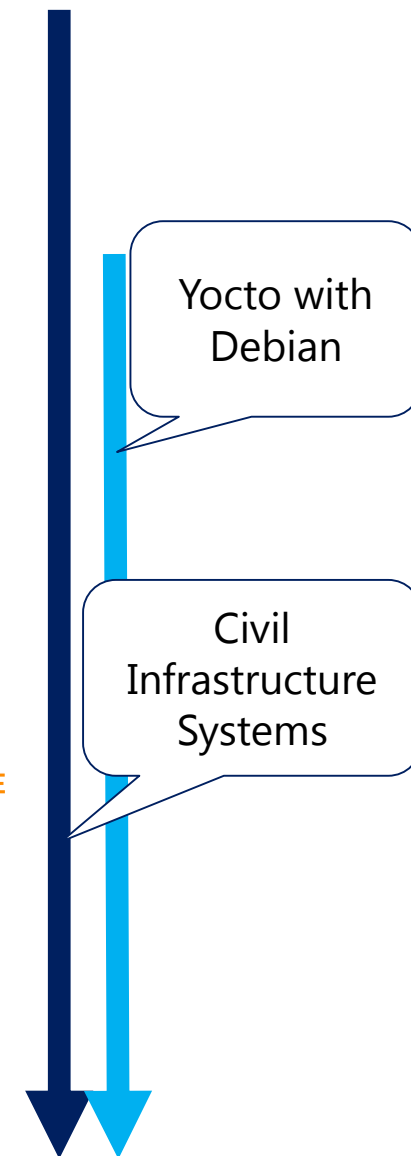


Make Linux
more stable
and reliable

Real-time

Focus on Civil Infrastructure Systems

- List of my presentations at Linux Foundation's conferences
 - Using Embedded Linux for Infrastructure Systems (ELCE 2014, Oct 2014)
 - Poky meets Debian: Understanding How to Make an Embedded Linux by Using an Existing Distribution's Source Code (ELC, Apr 2015)
 - BoFs: Applying Linux to the Social Infrastructure (ELC, Apr 2015)
 - Applying Linux to the Civil Infrastructure Systems (LinuxCon Japan, Jul 2015)
 - CE Workgroup Shared Embedded Linux Distribution Project (ELC-E, Oct 2015)
 - Introducing the Civil Infrastructure Platform (ELC, Apr 2016)
 - The Latest Status of the CE Workgroup Shared Embedded Linux Distribution Project (ELC, Apr 2016)
 - Introducing the Civil Infrastructure Platform (LCJ, Jun2016)
 - Time is ready for the Civil Infrastructure Platform (ELC-E, Oct 2016)



Recent activities of the CE workgroup

- **Embedded Linux Conference (ELC / ELC Europe)**
 - Embedded Linux Conference (ELC) is the premier vendor-neutral technical conference for companies and developers using Linux in embedded products.
- **Elinux.wiki**
 - The technological information portal of OSS for embedded system developers
- **Linux in Civil Infrastructure (was called Social Infrastructure)**
 - Goals: Solve problems with Linux for use in civil infrastructure systems
 - Status: Closed. because already launched a new collaborative project
- **Device Mainlining**
 - Goals: Study obstacles to mainlining, and work to reduce obstacles
 - Status: SIG meetings at ELCE and ELC
 - Presentations about overcoming obstacles at ELCE 2014, ELC 2015, and LCJ 2015
 - White paper (published at LCJ – June 2015)
- **LTSI / LTSI-Testing**
 - Goal: An extended support program based on industry requirement (Long Term Support Initiative) is carried out together with the Linux community
 - Status: Released LTSI-4.1 released. Fuego (aka. JTA) is presented at ELC2016
- **Shared Embedded Distribution**
 - Goals: Create an industry-supported distribution of embedded Linux and provide support for long term
 - Status: Created a Poky meta layer by using the Debian source code
 - Presented at conferences (ELC, LinuxCon)

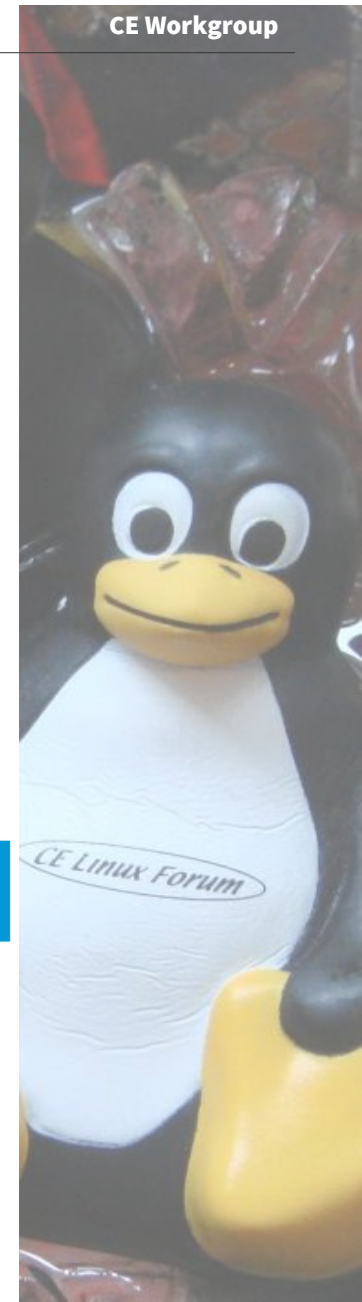


CIVIL
INFRASTRUCTURE
PLATFORM



LONG TERM
SUPPORT INITIATIVE

CE Workgroup

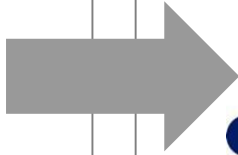


Short history of our participation in open source projects

CE Linux Forum



Joined 2003



The Linux Foundation (joined 2003 as a member of OSDL)



merged 2010

⋮



initiated 2015



joined 2015



joined 2015



joined 2015



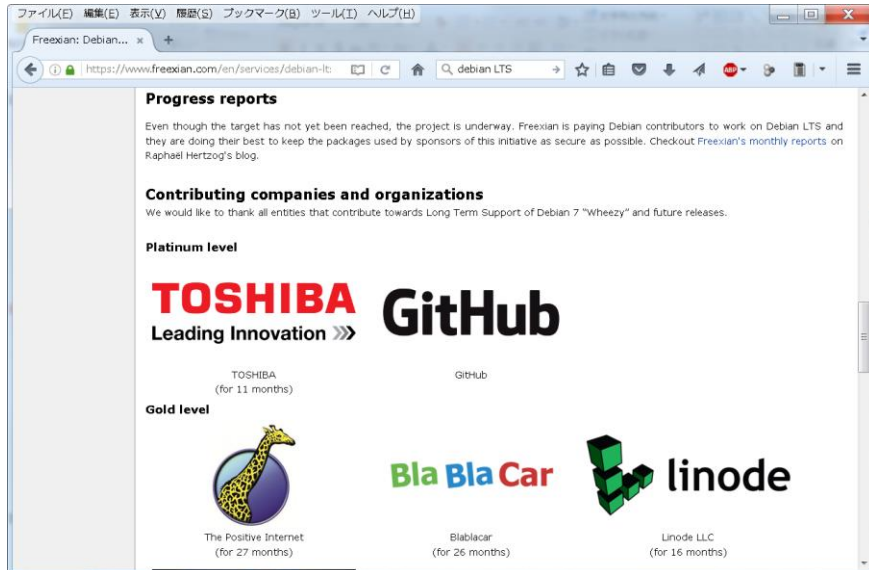
initiated 2016

Debian

Debian-LTS

joined 2015

Relationship between Debian/Debian-LTS and Toshiba

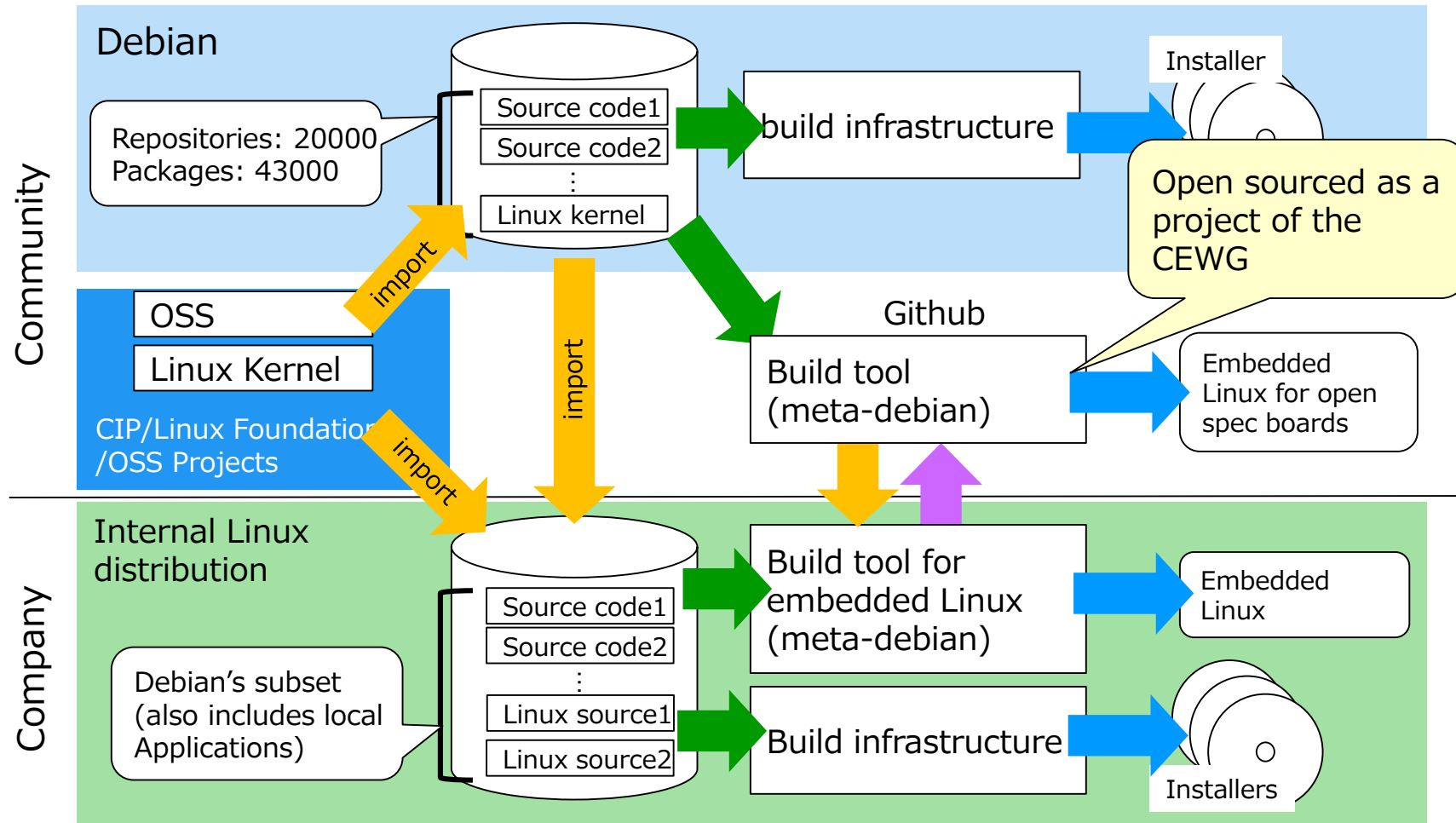
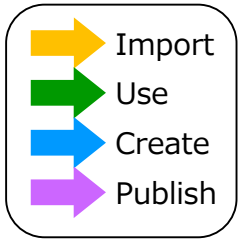


- **Joined Debian-LTS as a Platinum level sponsor**
 - Seven reasons why you should help funding Debian LTS (<https://www.freexian.com/en/services/debian-lts.html>)
 - Ensure that the packages that you rely on get priority in terms of security support;
 - Ensure that security updates will not generate regressions in your production infrastructure by providing functional tests to run before release;
 - Benefit from direct contact to the LTS staff in case of specific queries and requests;
 - Influence future developments made by the sponsored developers so that Debian continues to fit your needs;
 - Generate goodwill among the free software community thanks to your appearance in the list of sponsors;
 - Even if you do not use Debian 7 currently, you ensure that Debian 8 and Debian 9 will also benefit from long term support.
 - Benefit from the experience of people from other Debian-using companies thanks to a private mailing list.
- **Why did we join?**
 - Would like to contribute security fixes if we really needed

Relationship between Debian/Debian-LTS and Toshiba

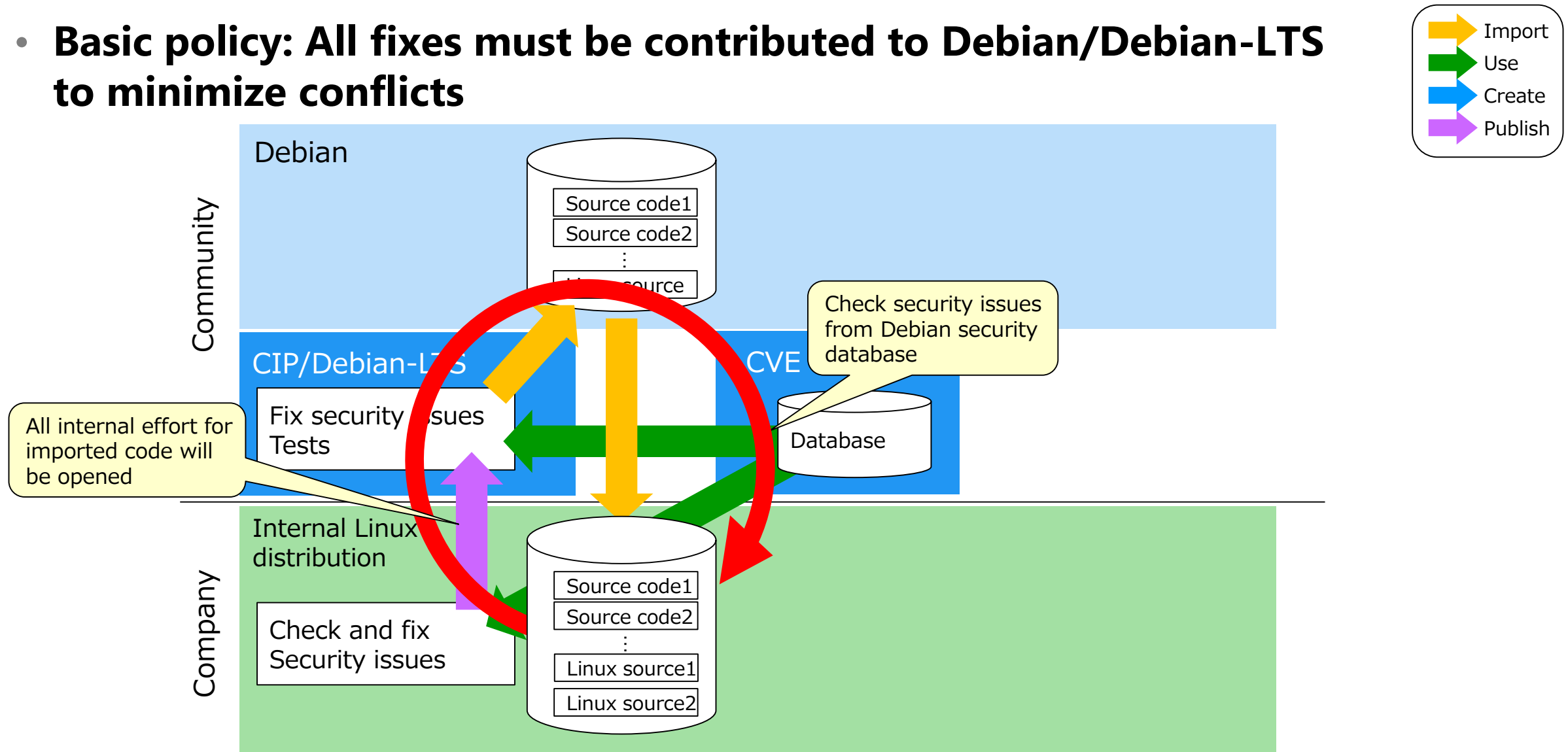
- **We have an internal embedded Linux distribution**

- Based on Debian
- A meta layer for Poky to use Debian's source code instead of Open Embedded



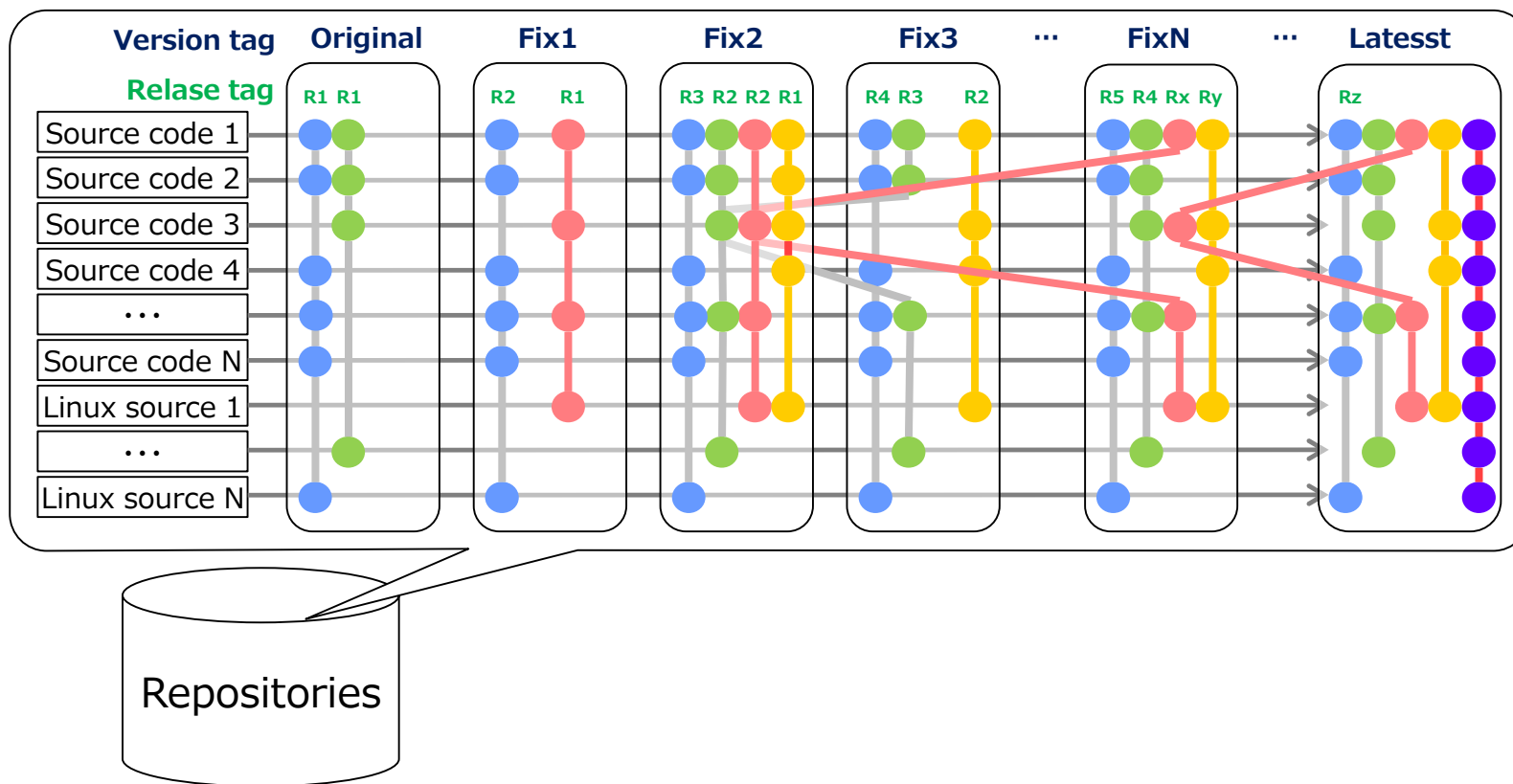
How to work with the community for maintenance

- **Basic policy: All fixes must be contributed to Debian/Debian-LTS to minimize conflicts**



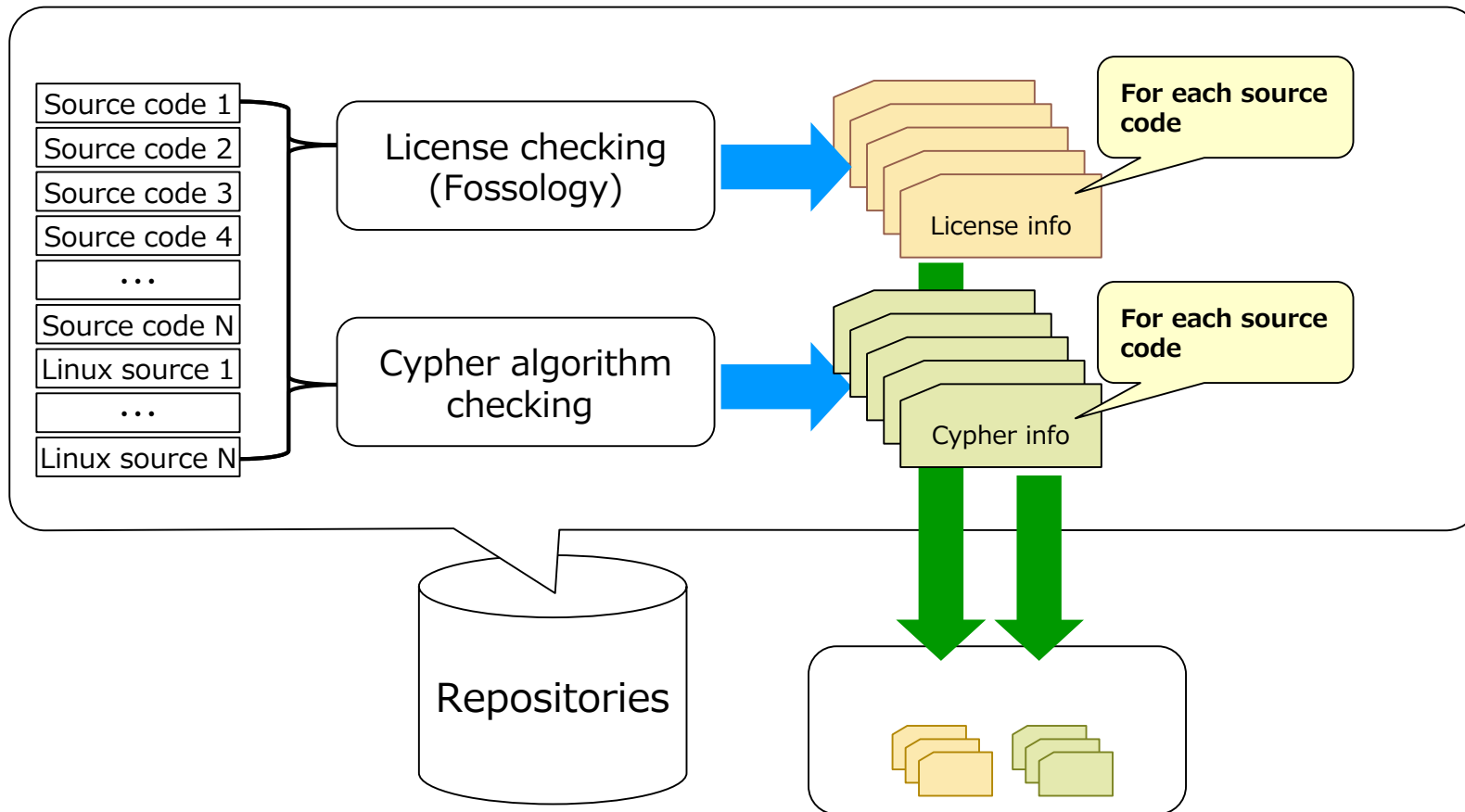
Tag based source code management

- All source code has to be stored in repositories
- What's the purpose?
 - Being able to rebuild an specific image with the same source code and tools
 - Checking security issues for each image



OSS license management and export control

- Checking all source code to generate the license and cypher algorithm information
- Manually reviewed



Lessons learned from our contributions to Debian-LTS

Subject: Re: [debian-lts] file package
Date: Sun, 15 Feb 2015 23:56:19 +0100

wrote...

> I would like to send the debdiff file for file package.
> Could any one please review it and give me some comments.

NACK. This does not fix the issue or introduces a new one.

An updated file package for squeeze has already been prepared here and just awaits the fix in wheezy by the stable security team.

For the records, **I cannot see an attempt to contact me beforehand about this.**

Before

1. There is a package list which requires a security fix
2. Someone takes a package from the list
3. Post the fix to Debian LTS for review

Subject: Re: [debian-lts] file package
Date: Thu, 19 Feb 2015 11:29:20 +0100

Hello,

yesterday **I implemented a small helper script to help contact the maintainers of packages who have open security issues in Squeeze.** It's the security tracker repository and works like this:

`bin/contact-maintainers --lts [--no-dsa] <pkg> [<cve...>]`

When you use the `--no-dsa` flag it will send a mail like this one where we explain that we won't take care of the update but we offer the maintainer an opportunity to take care of it himself:

<https://lists.debian.org/debian-lts/2015/02/msg00051.html>

After

1. Ask to the package maintainer for security fixes
2. If the maintainer is busy, someone from the Debian-LTS team will fix it.
3. Post the fix to Debian LTS for review

We need to collaborate with proper person in the community

Current status

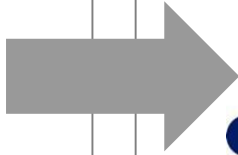
- **Still ongoing**

Short history of our participation in open source projects

CE Linux Forum



Joined 2003



The Linux Foundation (joined 2003 as a member of OSDL)



merged 2010

⋮

KINETIC
Open Storage Project
initiated 2015



CLOUD **FOUNDRY**
joined 2015

AUTOMOTIVE
GRADE **LINUX**
joined 2015

 **CIVIL
INFRASTRUCTURE
PLATFORM**
initiated 2016

Debian

Debian-LTS
joined 2015

(Cont.)

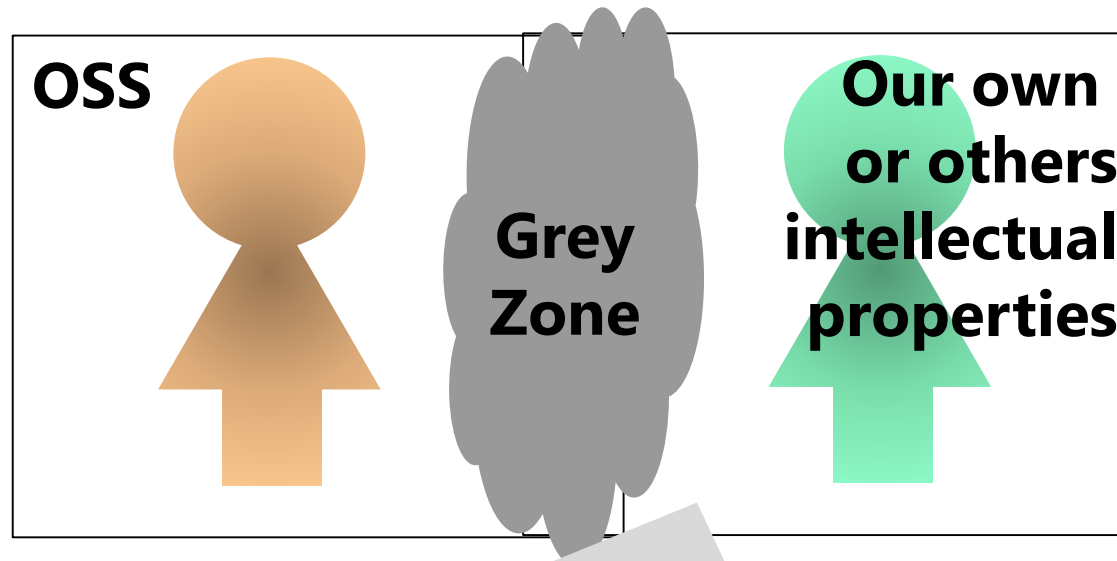
- Each products have their own contact point,
it is not difficult to concentrate all information:
for their life cycles of software are quite various, or
products are released so often.
- Our team is going to manage single source tree of Linux
“**Deby**” is a Poky (Yocto Project) based tool:
“**recipes**” make binaries of each product and
have license information of each component

<https://github.com/meta-debian>

- Next: 3 Issues we have

Issue 1:

- How to distinguish between OSSes and proprietaries as a license compliance point of view ?



We would contribute our code.

It is required to distinguish between OSS components.

Issue 2:

- How to manage so many OSS components ?
- We do not want any limitation.

<http://collabprojects.linuxfoundation.org/>



1M+ projects
2.4K+ licenses
(in the world)

Using License Checker is a good solution.

It is required to much knowledge.

Issue 3:

- **How to chose or even design new license for new OSS project ?**

An example of new project:

<http://www.cip-project.org/>



The Civil Infrastructure Platform ("CIP") is a collaborative, open source project hosted by the Linux Foundation. The CIP project is focused on establishing an open source "base layer" of industrial grade software to enable the use and implementation of software building blocks in civil infrastructure projects. Currently, civil infrastructure systems are built from the ground up, with little re- use of existing software building blocks.

Discussion points for license selection

- Activating OSS community (I think Linux took best choice)
- Applying various products quickly with less ambiguous
- Protecting Patents and Intellectual Properties
- ... others ?

Conclusions

- **Using embedded Linux for more than 10 years**
 - Consumer Electronics
 - Civil Infrastructure Systems
 - Storage systems
 - SoCs
- **Toshiba is participating in OSS projects**
 - CE Workgroup
 - Debian-LTS
 - Civil Infrastructure Platform
- **In my opinion, there is a lot of “collaboration” between in-house engineers, community, and lawyers.**
- **For the future we should**
Communicate better with each other,
Reach a consensus through discussions, and
Collaborate to bring new innovations to the OSS!

**Thank you !
&
Questions?**

TOSHIBA

Leading Innovation >>>